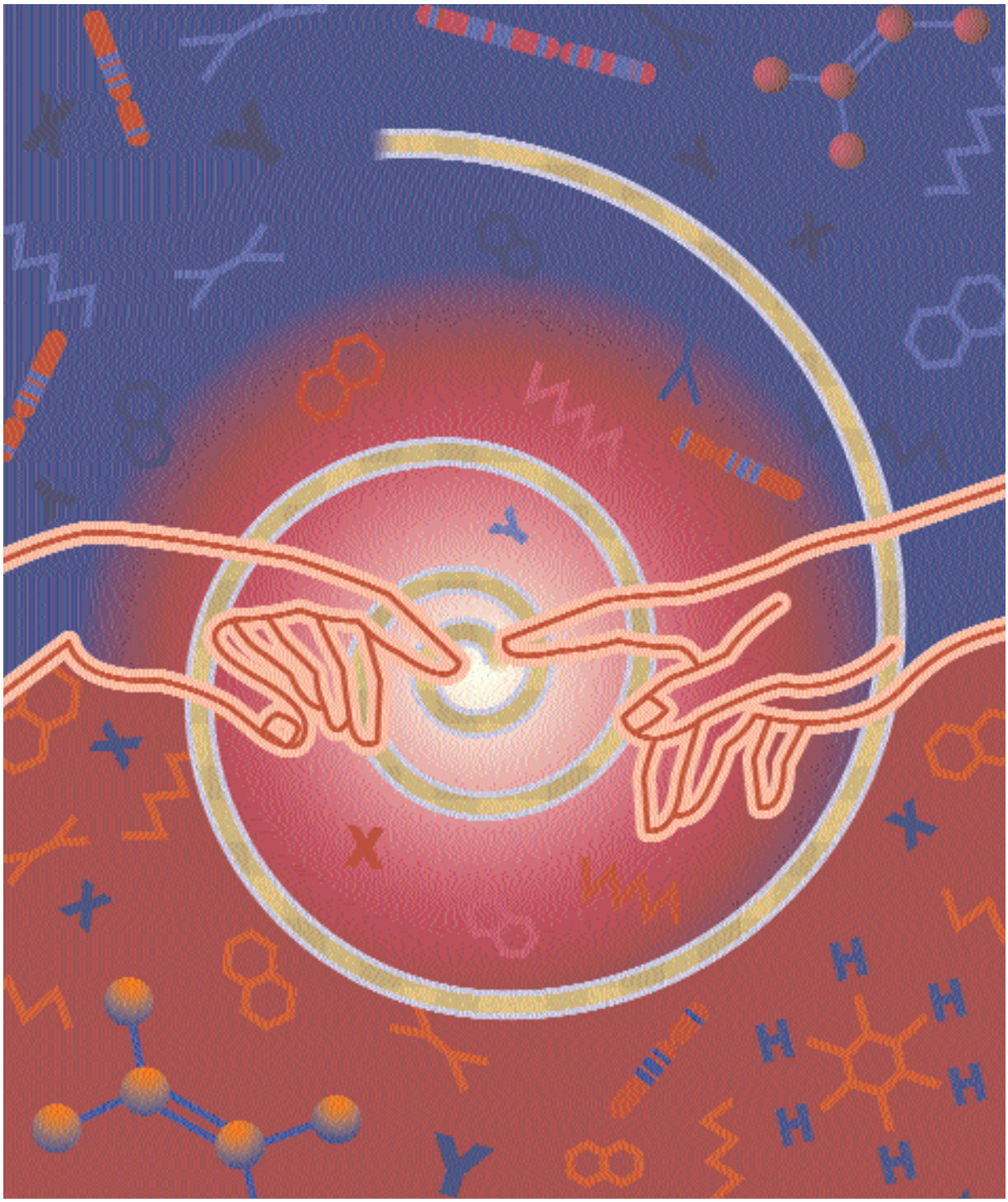
Putting **Faith** in **Science**



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Intelligent design — an alternative theory of life supported by many Christians — argues that science alone can't explain the mysteries of our existence. And most Americans agree. **Why has science been so unconvincing?**

By Deborah Blum MA'82

"The impregnable position of science may be described in a few words. We claim, and we shall wrest from theology, the entire domain of cosmological theory. All schemes and systems which thus infringe upon the domain of science must, in so far as they do this, submit to its control, and relinquish all thought of controlling it."

— John Tyndall, to the British Association for the Advancement of Science, in 1874

Science stood transcendent when John Tyndall, the great Irish physicist, made his famous boast, standing atop the technological advances of the mid-nineteenth century: telegraph cables linking North America to Europe and Europe to Asia, the periodic table of elements newly devised, and useful inventions from celluloid to the pressure cooker amazing consumers. Beyond technology, researchers were redefining the natural world, most notably with the 1859 publication of Charles Darwin's book *On the Origin of Species*. There was nothing, it seemed, that science couldn't explain or accomplish.

Except, of course, to live up to Tyndall's expectation that it would — or could — become the only way to understand life on a challenging planet. More than 130 years after his declaration, science has reshaped the world in ways that even the most optimistic physicist might have failed to imagine. Yet theology still matters, religion remains one of the world's most powerful forces, and — to take the most contentious case of the moment — Charles Darwin's theory has yet to be accepted by millions of people around the world.

Using evolution theory as a measure, a startling number of people seem to find science inadequate as a way of understanding the world around them. A recent survey by the Pew Forum on Religion and Public Life found that three-fourths of Americans are dissatisfied with Darwin's explanation of life. A Gallup poll last fall reached a similar conclusion, adding that a majority of the dissatisfied were educated men and women — in fact, college graduates. Further, the Gallup survey found that 53 percent of those questioned preferred to believe that God created humans in their present form. And of those who did accept evolution, most considered the process so complex as to need help from an "intelligent designer."

Such potent cultural beliefs are changing the landscape of education in the United States. School boards in Grantsburg, Wisconsin, and Dover, Pennsylvania, have flirted with requiring science teachers to devote class time to intelligent design as an alternative to evolution theory. And while those efforts failed, experts are less sanguine about the next round of challenges. Eighteen states have indicated that they will explore whether their schools should teach other ideas in science classes — from Kansas, which is already working to alter textbooks, to Florida, which has ordered a complete textbook review in 2007.

Among the scholars following — and worrying over — these trends is Ronald Numbers, a UW-Madison professor in the history of science and medicine. Along with many of his peers, Numbers suspects that a more conservative U.S. Supreme Court is likely to support one of those efforts, overturning a long tradition of upholding standard science in the classroom. At the same time, evolution critics are growing increasingly refined in their attempts to inject other ideas into the curriculum. Some are now pushing for "critical evaluation" of evolution theory and its alternatives, a strategy that experts think is less likely to run afoul of constitutional prohibitions on mixing church and state.

"They may win that one when it comes along," Numbers says.

But for Numbers, one of the leading scholars of the creationist movement, the critical question for science is not what might happen, but what already has. Far from wresting cosmological theory from the theologians, science appears to be losing tread with the public on one of its most basic tenets. And Numbers may be one of the best people in the country to ask why.

"As I see it, my job at the moment is not to solve the problem but to help diagnose it so that it can be solved," he says.

Entering Numbers's office, in the Department of Medical History and Bioethics, is akin to entering a cave of books. Books rise along the walls in towering cases. They cobble the wide surface of his desk. They climb like stalagmites in stacks that rise from the floor. Numbers sits behind his piled desk like a priest of paper, white-bearded, kind-faced, surrounded by the troubled history of science and religion.

Those volumes weave a history of two worlds that have collided far more often than they have connected. A significant reason, says Numbers, is scientific arrogance, which neither began nor ended with Tyndall's grandiose claims of a world illuminated only by science. Modern examples include the British geneticist Richard Dawkins, who routinely couples the words *faith* and *ignorance*, and the American philosopher of science Daniel Dennett, who recently told the *New York Times* that religious "belief can be explained in much the same way a cancer can."

conflicts between facts and faith in the post-Darwinian world. He was born in Boulder, Colorado, in 1942, the bright and curious son of a Seventh-Day Adventist missionary, who himself was the son of an Adventist minister. "I come from four generations of Adventists," Numbers says. "I'm the first son not to be a minister, which makes me the family black sheep."

Expecting to follow the family tradition, Numbers started writing sermons when he was five years old. Even when he was in graduate school, at the University of California at Berkeley, he remained true to his religion, keeping to the Adventist community at the university.

But at Berkeley, provoked by science, Numbers began to wonder about the rightness of his beliefs. He found it increasingly difficult to reconcile his church's doctrine — part of which says God created the earth six thousand years ago — with fossil records that detailed millions of years of plant and animal life.

theism. It was one big ball of wax. It was at once exhilarating and terrifying."

The book, published in 1976, concluded that White was often mistaken about the world, and sometimes knowingly so. Before it was released, officials at Loma Linda, having learned of its conclusions, asked Numbers to leave. His work went over no better with his family. "My father was so humiliated that he took early retirement," Numbers says, and although the two men eventually made their peace, for years, his father refused to be seen with him in public.

The best thing that came out of his critical scholarship, he says, was that the UW offered him a job. He moved to Madison in 1974 to join the university's history of science department, the oldest of its kind in the country. Yet no one, including Numbers, imagined that creationism would become such a powerful modern force.

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"Dennett and Dawkins say believing in God is stupid. Which is stupid," says Numbers. "We're not going to get very far by assuming that all these people are too stupid to know what they're talking about or that creationists don't know anything. Of course, what helped me in that perspective was that I grew up with people who *were* creationists, so I already knew that a lot of them were very smart."

The story of how Numbers arrived at Wisconsin is in itself an illustration of the

After joining the faculty at Loma Linda University, an Adventist college in southern California, he began researching a book on Ellen G. White, the famed nineteenth-century prophetess of the Adventist church, whose visions of young-earth creationism helped define its religious beliefs.Yet the countering evidence of science, with its catalogues of ancient fossils, troubled him enough to wonder if White was wrong, and that, he admits, "was a very slippery slope. At the same time, I was questioning my lifelong

on the road to secularization and just mopping things up," Numbers recalls, smiling. It was his own background that prompted him to continue gathering information on the issue, exploring it, wondering about where it was going.

He was also encouraged by David Lindberg, longtime chair of the department and a renowned scholar of science in the medieval period. Lindberg had a background similar to his colleague's, having been raised by an evangelical minister father, and like Numbers, he

found in history a subversive kind of truth, which led him to question his belief system.

"Historical study is corrosive," says Lindberg, now a professor emeritus. "Once you start asking questions about why someone you're studying believes something — whether it's true, where it came from —if you're honest, you end up asking the same questions of yourself."

In 1978, the two men decided to organize a national conference on science and religion, which led to a heralded book, *God and Nature*. Their thinking turned out to be prescient, seeming to anticipate a surge of creationist activism in the early 1980s. Two states, Arkansas and Louisiana, passed laws requiring creationism to be included in science curricula, leading to a challenge that reached the Supreme Court. In 1987, the court tossed out the laws as unconstitutional, noting that creationism was religion masquerading as science.

That case gave evolution a legal victory, but a hollow one. Scientists and educators were faced with the reality that more than a century of science had not altered deep-seated beliefs within the Christian community about the origins of life.

"By this time everyone knew that we were looking at a very hot issue," says Numbers, who testified in the case. He began work on a book chronicling the origins and modern rebirth of the creationist movement. *The Creationists* was published in 1992, before most people had ever heard the term *intelligent design*. Yet it reads like a predictive lesson on the confrontations of the day, describing the "amazing resiliency of Christian beliefs" and exploring why those beliefs have often been posed as a challenge to scientific explanations of our world.

Now at work on a revision of *The Creationists,* Numbers is focused these days on intelligent design, the modern inheritor of the creationist movement. The basic argument of intelligent design proposes that the complexity of biological life is itself evidence of a designer, a higher being at work. An example, given by the Discovery Institute, a conservative think tank in the Pacific Northwest, is that some living cells are so incredibly complex that they simply could not have been built by random mutation. Advocates say that science has failed to explain such complexity — or to acknowledge the inadequacy of its explanations.

"Of course, intelligent design is a strategy to get around separation of church and state in this country," says Numbers. But it's also revealing. Fundamentalist Christians who support intelligent design argue that science is insufficient as a means to understand the mystery of life, yet they know they can't ignore research findings entirely. The solution is to rewrite them. As Numbers puts it, "the ID people want to baptize their own views as science."

In Grantsburg and Dover, school board members bought the argument, calling for intelligent design to be taught as a critique of evolution, suggesting that it remains an unsettled question of science. What has genuinely infuriated many researchers is that no such scientific controversy exists. The tenets of natural selection and gradual evolution are not merely widely accepted — they have been shown to work in the lab and in the wild. Scientists have observed evolution in progress in species from simple bacteria to sophisticated creatures, and they have used evolutionary theory to make and test predictions about how species change over time. In one recent study of chimpanzees at the Massachusetts Institute of Technology, researchers showed that the genetic mutations forecasted by Darwin's theory actually have occurred.

"What makes evolution a scientific explanation is that it makes testable predictions," the lead scientist on that experiment, the Nobel laureate Eric Lander, said in announcing the study. "You only believe theories when they make non-obvious predictions that are confirmed by scientific evidence." By the most basic standards — testability, repeatability, and predictability — intelligent design thus fails to qualify. In the eyes of most researchers, the "controversy" surrounding evolution may be religious or political, but it is not scientific.

"The difference between science and non-science is a standard problem, discussed for many years as a philosophical issue," says Elliott Sober, a UW-Madison professor of philosophy who has studied the question of whether creationism can be considered a scientific theory. How, he asks, does one calculate and test the explanations of intelligent design? To hypothesize that God created the earth's species, for instance, a scientist would need testable probabilities that species with certain features would arise based on the designer's intentions. So far no one studying science, philosophy, theology, or intelligent design has come up with a way of doing that.

"Maybe we'll find a better way of thinking about testability," Sober says. "You can't rule that out. But I doubt that's going to turn out right and for now, I think we can say that if a theory is not testable, it is not science."

So far, the courts — and the court of public opinion — seem to agree. In Grantsburg, the school board last year withdrew its November 2004 motion to put intelligent design into its science curriculum after heavy public protest. A central California school district also dropped a planned intelligent design class early this year, and in February, the Ohio board of education backed away from requiring biology teachers to discuss the controversy surrounding evolution.

In the Dover school board case, a federal judge delivered a blistering defeat to intelligent design in December of last year. "To be sure, Darwin's theory of evolution is imperfect," wrote Judge John Jones III. "However, the fact that a scientific theory cannot yet render an explanation on every point should not be used as a pretext to thrust an untestable alternative hypothesis into the science classroom or to misrepresent well-established scientific opinions."

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Still, no one expects this to be the final word on the teaching of science. The Discovery Institute's John West, who angrily told reporters following the Dover decision that it indicated nothing more than the opinion of an "activist judge," foresees more success for intelligent design in places such as Kansas, where the state school board voted last fall to redefine science to include the supernatural and to encourage science teachers to question the theory of evolution.

Creationists have waged this battle before, most famously in the 1925 trial of Dayton, Tennessee, schoolteacher John Scopes, who was charged with teaching evolution in his classroom. While the case was ultimately dismissed due to a technicality, the popular perception is that the attention surrounding the Scopes trial resulted in a triumph of science over superstition. But it also helped shore up a determined core of Biblical literalists, who would keep the evolution debate on a slow simmer for the next several decades.

Michael Ruse, a philosopher of science and religion at Florida State University, says events of the mid-twentieth century helped fire up that debate again. "The bomb at the end of the second world war made people think of Armageddon," he says. "And the Cold War again gave the feeling that the end times might be near."

Many devout Christians were further motivated by the founding of Israel — interpreted by fundamentalists as a sign of Revelation, as predicted in the Bible — and the approaching new millennium, convincing many that the world needed to return to the gospel before it was too late.

More pragmatically, American textbooks were revised during the post-Sputnik race to the moon, with a science-first emphasis that was far more dogmatic about Darwinian science. Numbers says the changes helped spark a new sense of alarm and a powerful us-against-them mentality in the Christian right.

Science, however, was slow to recognize these cultural shifts, often dismissing criticism of evolution as uninformed or unimportant. When Kansas convened public hearings to discuss the merits of intelligent design, most scientists stayed away, thinking that if they refused to testify, it would be obvious that the idea wasn't even worth discussing. They were shocked when the decision went so clearly against them.

"The average scientist in the lab is not just unaware, but very hostile to the idea that there might be extra-scientific ideas influencing his or her work," Ruse says. "[Thomas] Kuhn made this point well — science is a form of indoctrination. Hard work when you are young, poor pay, having to do what the boss demands, and so forth. It is very much like becoming a Jesuit. You are taught that you are different, that culture stays outside the lab, and if you are to be successful, then you believe this."

Only one national science organization, the American Association for the Advancement of Science (AAAS), runs a program dedicated to working on the relationship between science and religion. Its director, a planetary geologist named Connie Bertka, admits that it is a unique idea in the culture of science. She acknowledges that many scientists see no reason for a dialogue involving religion, contending that the only necessary discussion is to ensure that people don't misinterpret the role of research. Their message, she says, is that science explains how things work or happen. It does not give meaning to them.

Bertka says the point is clear and correct, but she fears that people will draw a different conclusion from that message: "that science is irrelevant to people's lives," she says. "And I worry that we're seeing the consequences of that now."

Michael Zimmerman, dean of letters and science at UW-Oshkosh, had that same fear while listening to national media coverage of the Dover case. The basic message of fundamentalists, he recalls, was "choose evolution or choose heaven, choose creationism or choose hell. And I was just so angry. I know Americans are a religious people. And I know even if they don't go to church, if they are forced to choose, they'll choose religion. And this was a false choice."

Zimmerman, an evolutionary biologist, has been fighting back by trying to build a consensus around the idea that science and religion are not in opposition. After the Grantsburg school board voted to allow the teaching of intelligent design, he began rounding up signatures on letters of protest. He organized a letter signed by administrators from all the UW campuses, a letter signed by theologians and biologists, a letter signed by anthropologists, a letter signed by geologists, and a letter signed by professors at private universities. And then, he did what he considered the really hard work. He persuaded two hundred ministers from around Wisconsin to sign a state-

ment saying that they didn't agree with the action of the school board, that they thought the truths of the Bible and the discoveries of science could peacefully coexist, and that churches should teach religion and schools should convey science as accurately as possible. Many around the state credit this clergy letter, in particular, for influencing the Grantsburg board's decision to rescind its intelligent-design proposal.

Last year, after watching news coverage of the Dover court battle, Zimmerman decided to make his clergy letter national. By early 2006, more than ten thousand clergy members had signed the letter, representing every state in the country, countless religious denominations, small churches, large cathedrals, and "presidents of seminaries, ministers in the military, clergy from red states and blue states, every territory except American Samoa," Zimmerman says.

The letter reads, in part, "We believe that among God's good gifts are human minds capable of critical thought and that the failure to fully employ this gift is a rejection of the will of our Creator." Zimmerman says it shows that the "shrill voices of the fundamentalists" are not the only voices of religion in this country.

Many scientists hope the letter makes a point, emphasizing the ways in which science and religion connect, rather than conflict. "There are theologians who have worked to consider what a loving God means in relation to the fact of evolution," says Connie Bertka, of the AAAS. "Is that the job of the scientists? No. Can we help theologians understand the science? Yes. I think given the situation in this country, it makes sense for the scientific community to look for ways to encourage that work."

Both she and AAAS are working in that direction, meeting with members of the clergy interested in science lessons and providing written materials. This summer, the group will publish a book, *The Evolution Dialogues,* which provides information about natural selection, including the theory's history and cultural perspectives. She hopes that seminaries will use some of the information, in particular with the next generation of the clergy.

At the same time, Elliott Sober hopes the next generation of scientists will learn to better communicate what they do and what it means.

"Scientists didn't show up in Kansas, and they now realize that was a mistake," he says. "There's a growing awareness in the scientific community that they need to better communicate with the public, do a better job of explaining. They need to show up and make the case."

Sober is among a cohort of UW-Madison scientists who are backing a bill introduced in February in the Wisconsin state legislature that seeks to keep "political and religious influence" out of science classes. The bill, introduced by Demo-cratic state representative Terese Berceau '73, is the first bill in the country that seeks to protect the integrity of science instruction in the classroom. It would require that any scientific material taught be testable, described by natural processes, and "consistent with any definition of science developed by the National Academy of Science."

While Numbers served as an adviser on the bill, he says he's "not a big one on passing laws, and I don't think religion should be squelched." But he agrees generally that scientists need to make their case more forcefully. And he'd prefer to see it done in the classroom.

"I would begin and end with the teaching of evolution," he says. "We're not really teaching evolution, even at the university level. Part of the problem is that everyone wants to teach in their specialty, and evolution spans a whole range of specialties. But we could put together a team of specialists — and I think we should."

But Numbers is a realist, and he recognizes that the bigger problem for science is something that John Tyndall never considered: if it came down to an either-or scenario between science and religion, the ultimate loser may be our own humanity. For all its illuminating power, scientific knowledge rarely leads to absolute certainty, and few of us would be satisfied with strict facts alone to help us comprehend our existence. As Albert Einstein famously noted, "Science without religion is lame; religion without science is blind." If, as scientists argue, accepting intelligent design is choosing blind faith, is the alternative something more than lameness? "The will to believe is so strong," says Numbers, "that it can trump any empirical evidence."

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